

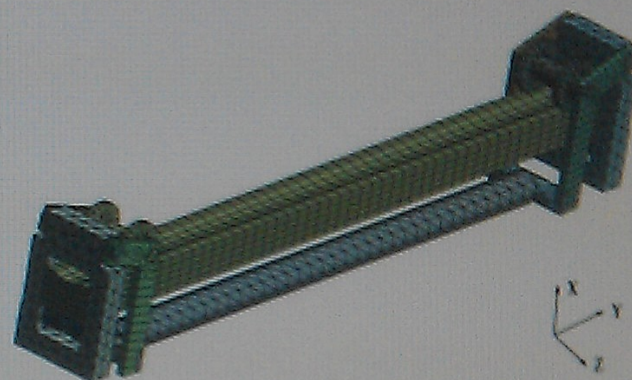
Numerical simulation on synchrotron radiation bending equipment for optical mirrors

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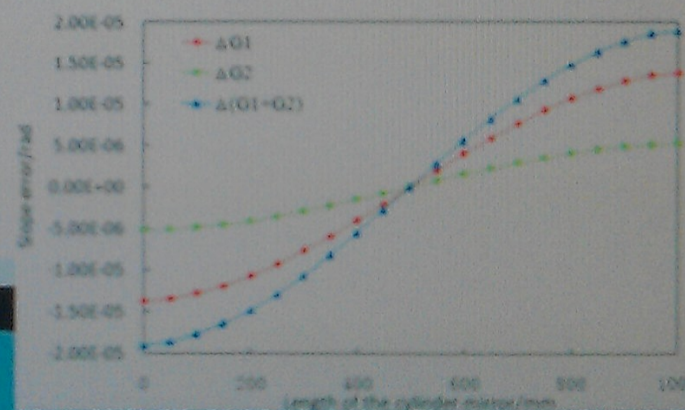
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Dynamic simulation on bending equipment in synchrotron radiation field is studied in this paper. Finite element model of bending mirror is established, and bending process, bending state and bending mechanism during different bending conditions are researched. Numerical analysis on bending drive mechanism is completed, and gravity compensation method is got under deadweight condition. Surface changing of bending mirror induced by deadweight of bending mirror is analyzed, and the surface changing is overcome and offset by compensation mechanism. The best design of bending equipment is obtained by the compensation mechanism, and numerical analysis results are verified. According to the structural characteristics of the bending equipment, the entire equipment is simplified necessarily, and entire finite element model including drive system, clamping mechanism and optical mirror is established. Base on the entire FEA model, main factors affecting surface accuracy of bending mirror are studied deeply, and the bending equipment is optimized, and satisfactory results are obtained.

The simulation results show that the slope error of generatrix of cylindrical mirror decreases from $13.14\mu\text{rad}$ to $0.15\mu\text{rad}$, and meridional slope error of mirror decreases from $8.21\mu\text{rad}$ to $0.86\mu\text{rad}$. The purpose of improving surface precision of bending mirror is achieved.



Finite element model of bending equipment



Slope error of generatrix of cylinder mirror